

## Digital Focusing Schlieren for Hypervelocity Ground Testing, Phase I

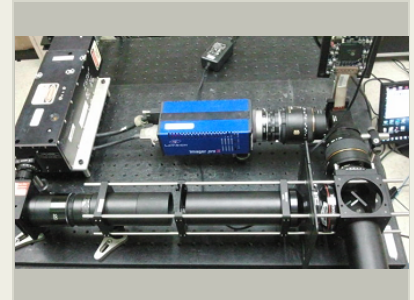
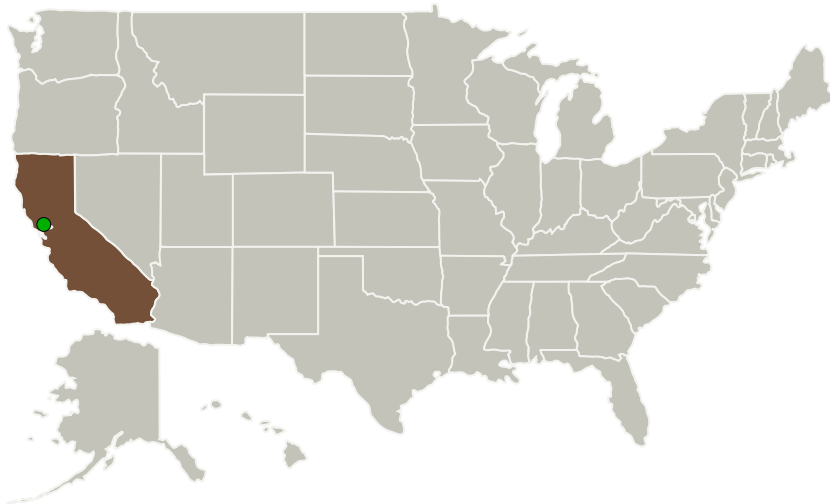
Completed Technology Project (2015 - 2015)



## Project Introduction

We propose to adapt a revolutionary digital focusing schlieren imaging technology to hypervelocity ground testing. Spectabit's digital focusing schlieren approach has greatly improved a widely used aerodynamics tool and rendered it so robust, user friendly, and productive that it can be used in test facilities and environments that have been prohibitive before. We have identified several key adaptations to this technology which can make it applicable to the submicrosecond time resolutions often required in hypervelocity testing environments. Some of these adaptations may be useful in other high-speed imaging techniques by enabling the suppression of laser speckle. The digital schlieren concept represents the first major improvement in schlieren imaging in over 150 years, a true quantum jump in the technology. Conversion to digital obviates many of the long-standing problems with focusing schlieren systems that are associated with precisely matching the cutoff grid to the background light pattern. Because the system is digital, the control software can perform real-time image enhancement as well. Consequently, the most severe hardware production and alignment restrictions are now software problems that are solvable continuously, quickly, and inexpensively in real time. This capability enables the system to compute and compensate for imperfect windows and optics, optical aberrations, misalignments, and temporal changes in the system and subject.

## Primary U.S. Work Locations and Key Partners

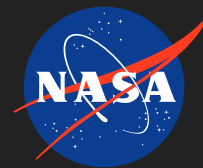


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Organizations Performing Work	Role	Type	Location
Spectabit Optics, LLC	Lead Organization	Industry	Laguna Hills, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California

## Project Transitions

▶ **June 2015:** Project Start

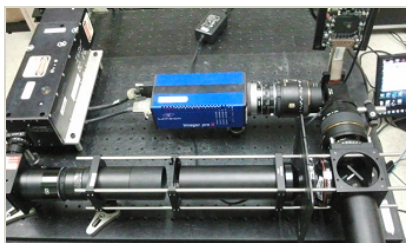
✓ **December 2015:** Closed out

**Closeout Summary:** Digital Focusing Schlieren for Hypervelocity Ground Testing, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/138941>)

## Images

**Briefing Chart Image**

Digital Focusing Schlieren for Hypervelocity Ground Testing, Phase I

(<https://techport.nasa.gov/image/128717>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Spectabit Optics, LLC

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

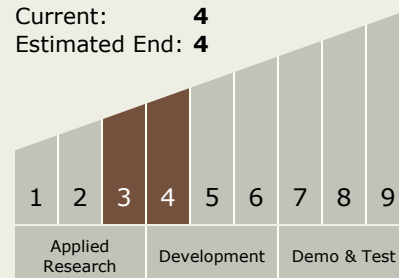
Carlos Torrez

**Principal Investigator:**

Benjamin D Buckner

## Technology Maturity (TRL)

Start: 3  
Current: 4  
Estimated End: 4



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## Technology Areas

### Primary:

- TX09 Entry, Descent, and Landing
  - └ TX09.4 Vehicle Systems
    - └ TX09.4.5 Modeling and Simulation for EDL

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System